

Appln. No. 10/065,595
Docket No. 125974/GEM-0053

REMARKS / ARGUMENTS

Status of Claims

Claims 1-13, 16-18, 20-28, 30 and 34-49 are pending in the application, and stand rejected. Applicant has amended Claims 1, 11, 16, 17, 24, 27, 38, 48 and 49, and has canceled Claims 37, leaving Claims 1-13, 16-18, 20-28, 30 and 34-36 and 38-49 for consideration upon entry of the present Amendment.

Applicant respectfully submits that the rejections under 35 U.S.C. §112, first paragraph, and 35 U.S.C. §103(a), have been traversed, that no new matter has been entered, and that the application is in condition for allowance.

These amendments and accompanying remarks were not presented earlier because Applicant did not fully appreciate the nature of the Examiner's position until the Applicant was advised in more detail of the position by the final rejection. The claim amendments presented herein, which Applicant respectfully requests entry thereof, should require only a cursory review by the Examiner as they include only clarifying language.

Rejections Under 35 U.S.C. §112, First Paragraph

Claims 48 and 49 stand rejected under 35 U.S.C. §112, first paragraph, for failing to comply with the enablement requirement. The Examiner alleges that the specification fails to set forth how the model can be "any combination" of the examples set forth.

While Applicant respectfully submits that Claims 48 and 49 do not recite "*any* combination", but instead recite "*a* combination", and further respectfully submits that it is common knowledge in the art of 3D computer modeling to combine image formats, such as wire mesh superimposed on top of a solid model for example, Applicant has nonetheless, in an effort to advance this case to issue, and without prejudice, amended Claims 48 and 49 as set forth above to overcome this rejection.

Claims 1-13, 16-18, 20-28, 30, 34-37, 40 and 42-49 stand rejected under 35 U.S.C. §112, first paragraph, for failing to comply with the written description

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requirement. The Examiner alleges that the specification, as originally filed, fails to disclose the use of “at least three geometric markers”.

Applicant respectfully disagrees.

At Paragraph [0030], Applicant discloses: “...the operator inserts *a geometric marker*, such as, for example, a sphere, into the volume *at an anatomical landmark for subsequent visualization* or analysis. *Multiple geometric markers and geometric landmarks may be inserted and visualized at one time.*”

At Paragraph [0035], Applicant discloses: “... A rigid registration technique typically requires *the identification of at least three anatomical landmarks*, whereas a non-rigid registration technique may require *the identification of more than three anatomical landmarks...* *Additional landmarks can also be used* such that a transformation of best fit (in a mean squared error sense) is calculated.”

At paragraph [0027], Applicant discloses: “*The segmentation of data* from a dataset refers to the extraction of a specific portion of the dataset that *relates to an anatomical landmark of interest*, such as, for example, the right atrium, the coronary sinus, or an external anatomical marker...”

Here, Applicant submits that the specification as originally filed clearly discloses that geometric markers are used to visualize anatomical landmarks, that multiple geometric markers may be used, and that multiple geometric markers may be used to identify “at least three” and “more than three” anatomical landmarks. As such, Applicant submits that the application as originally filed clearly discloses the use of less than three, at least three, and more than three geometric markers, and that one skilled in the art would appreciate from the application as originally filed that the use of at least three geometric markers is disclosed at least for the purpose of rigid registration.

In view of the foregoing, Applicant respectfully submits that the specification provides general guidelines as to the scope of the invention such that one of ordinary skill in the art would know what was meant, and that the subject matter of the invention has been described and is supported in such a way as to reasonably convey to one skilled in

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the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention, and therefore respectfully requests reconsideration and withdrawal of all rejections under 35 U.S.C. §112, first paragraph.

Claims Objections

Claims 1-13, 16-18, 20-28, 30, 34-37, 40 and 42-49, are objected to because of various informalities.

Applicant has amended Claims 1, 11, 16, 17, 24, 27, 48 and 49 as set forth above to correct for the informalities, and has canceled Claim 37. No new matter has been added as antecedent support may be found in the application as originally filed.

In view of the foregoing, Applicant respectfully requests reconsideration and withdrawal of these objections, which Applicant considers to be traversed.

Rejections Under 35 U.S.C. §103(a)

Claims 38 and 41 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Liu et al. (U.S. Patent Publication No. 2003/0166999 A1, hereinafter Liu) in view of Langberg et al. (U.S. Patent No. 6,706,065, hereinafter Langberg) or Foltz et al. (U.S. Patent No. 6,094,591, hereinafter Foltz).

Claim 39 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Lui in view of Langberg or Foltz as applied to Claim 38 above, and further in view of Subramanyan et al. (U.S. Patent No. 6,782,284, hereinafter Subramanyan), Chen et al. (WO 96/10949).

Applicant traverses these rejections for the following reasons.

Applicant respectfully submits that the obviousness rejection based on the References is improper as the References fail to teach or suggest each and every element of the instant invention *in such a manner as to perform as the claimed invention performs*. For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q.2d 1596, 1598

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(Fed. Cir. 1988). The Examiner must meet the burden of establishing that all elements of the invention are taught or suggested in the prior art. MPEP §2143.03.

Regarding Independent Claim 38

While Applicant believes that the language of Claim 38 was sufficiently distinguishable over the prior art of record without amendment, Applicant has nonetheless, in an effort to advance this case to issue, amended Claim 38 to more clearly associate the segmentation threshold with the intensity of the voxels within the coronary sinus, which one skilled in the art would already appreciate by reading Claim 38 in light of the specification. As such, Claim 38 now recites, inter alia:

“...dynamically adjusting a segmentation threshold in preparation for performing vessel tracking of the coronary sinus from the volume of cardiac image data, thereby enabling the coronary sinus to be tracked for both arterial-phase and venous-phase contrast enhanced studies, the segmentation threshold being associated with the intensity of the voxels within the coronary sinus of the cardiac image data.”

No new matter has been added as antecedent support may be found in the application as originally filed, such as at Paragraph [0024] for example.

Dependent claims inherit all of the limitations of the parent claim.

Here, Applicant is claiming the dynamic adjustment of a segmentation threshold from the volume of cardiac image data, where the segmentation threshold is associated with the intensity of the voxels within the coronary sinus.

For a prima facie case of obviousness to stand, the Examiner must show that the prior art of reference teaches each and every element of the claimed invention arranged *so as to perform as the claimed invention performs*.

Applicant respectfully submits that the prior art of reference fails to perform as the claimed invention performs.

At Paragraph [0046], with reference to Figure 4, Applicant acknowledges that Liu teaches “a method for vessel segmentation and separation”.

At Paragraph [0062], Applicant acknowledges that Liu teaches “automated separation of the venous and arterial subsystems”.

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However, at Paragraph [0059], Applicant finds Liu to teach “*an additional data acquisition of one or more slices that are used in vessel identification is performed. The resonance signals encoded* for the additional one or more slices are preferably interspersed among the resonance signals for the high resolution MRA volume image slices. Preferably, the interspersed vessel identification image slices are of low resolution and high scan speed.”

At Paragraph [0060], Applicant finds Liu to teach “a vessel identification k-space memory 42 that *stores the data corresponding to the at least one vessel identification slice...* The reconstruction processor also produces one or more vessel identification images of the one or more interspersed slices *corresponding to vessel identification images...*”

At Paragraph [0061], Applicant finds Liu to teach “*the arterial and venous data is essentially undifferentiated from each other...*”

At Paragraph [0062], Applicant finds Liu to teach “Automated separation of the arteries and the veins is advantageously enabled because *the one or more interspersed vessel identification slices provide a key* whereby the essentially undifferentiated arteries and veins of the high resolution image are separated.”

In view of the foregoing disclosure in Liu, Applicant finds Liu to teach that *arterial data and venous data is essentially undifferentiated from each other*, that *encoded resonance signals are used* in acquisition slices for vessel identification and that these encoded slices are interspersed among the high resolution resonance signals, and that these encoded vessel identification slices *provide the key* for separating the arterial data from the venous data, which Applicant submits is substantially different from the claimed invention, and that the Liu invention performs in a substantially different manner as the claimed invention.

While the claimed invention dynamically adjusts a segmentation threshold that is associated with the intensity of the voxels within the coronary sinus, where the voxel intensity is provided by the volume of cardiac image data, Liu encodes resonance signals to provide a key as to which signals provide arterial data and which signals provide

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venous data. Accordingly, Applicant submits that Liu fails to teach each and every element of the claimed invention *arranged so as to perform as the claimed invention performs*.

Applicant further submits that Langberg and Foltz fail to cure the deficiencies of Liu.

In view of the foregoing, Applicant submits that Liu, taken separately or in combination with Langberg and Foltz, fails to teach or suggest each and every element of the claimed invention *arranged so as to perform as the claimed invention performs*.

More specifically, Applicant submits that Liu, Langberg and Foltz, separately or in combination, fail to teach or suggest “*dynamically adjusting a segmentation threshold in preparation for performing vessel tracking of the coronary sinus from the volume of cardiac image data*, thereby enabling the coronary sinus to be tracked for both arterial-phase and venous-phase contrast enhanced studies, *the segmentation threshold being associated with the intensity of the voxels within the coronary sinus* of the cardiac image data.”

Regarding Claims 39 and 41

Applicant submits that Langberg, Foltz, Subramanyan and Chen, in the combinations alleged by the Examiner, fail to cure the deficiencies of Liu. In view of Claims 39 and 41 being dependent on Claim 38, Applicant submits that Claims 39 and 41 are allowable at least for the reason that they depend from an allowable claim.

In view of the foregoing, Applicant submits that the References fail to teach or suggest *each and every element of the claimed invention* and are therefore wholly inadequate in their teaching of the claimed invention as a whole, fail to motivate one skilled in the art *to do what the patent Applicant has done*, fail to offer any reasonable expectation of success in combining the References *to perform as the claimed invention performs*, and discloses *a substantially different invention* from the claimed invention, and therefore cannot properly be used to establish a prima facie case of obviousness. Accordingly, Applicant respectfully requests reconsideration and withdrawal of all

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rejections under 35 U.S.C. §103(a), which Applicant considers to be traversed.

Applicant has amended the claims for presentation in a better form that more clearly reflects Applicant's invention. The claim amendments should only require a cursory review by the Examiner as they merely include clarifying language.

In light of the foregoing remarks and amendments, Applicant respectfully submits that the proposed amendments and arguments comply with 37 C.F.R. §1.116 and should therefore be entered, and with their entry that the Examiner's rejections under 35 U.S.C. §112, first paragraph, and 35 U.S.C. §103(a), have been traversed, and that the application is now in condition for allowance. Such action is therefore respectfully requested.

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The Commissioner is hereby authorized to charge any additional fees that may be required for this amendment, or credit any overpayment, to Deposit Account No. 07-0845. In the event that an extension of time is required, or may be required in addition to that requested in a petition for extension of time, the Commissioner is requested to grant a petition for that extension of time that is required to make this response timely and is hereby authorized to charge any fee for such an extension of time or credit any overpayment for an extension of time to the above-identified Deposit Account.

Respectfully submitted,
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